

What is claimed is:

1 1. A method of forming copper interconnect, comprising:  
2 forming a dielectric layer over a substrate, the dielectric layer having  
3 trenches therein;  
4 forming a copper diffusion barrier at least in the trenches;  
5 depositing copper over the copper diffusion barrier and over a top surface  
6 of the dielectric layer; and  
7 polishing the copper with a high pH slurry;

1 2. The method of Claim 1, wherein the dielectric layer comprises an oxide of  
2 silicon, and the copper diffusion barrier is electrically conductive.

1 3. The method of Claim 1, wherein the dielectric layer comprises a  
2 fluorinated oxide of silicon, and the copper diffusion barrier is selected from the  
3 group consisting of tantalum, and tantalum nitride.

1 4. The method of Claim 1, wherein the high pH slurry has a pH between  
2 approximately 7.5 and 12.

1 5. The method of Claim 4, wherein the high pH slurry has a pH between  
2 approximately 8 and 11.5.

1 6. The method of Claim 1, wherein the slurry contains approximately 2% to  
2 10% by weight of  $\text{SiO}_2$ .

1 7. The method of Claim 1, wherein the slurry contains an oxidizer comprising  
2  $(\text{NH}_4)_2\text{S}_2\text{O}_8$ .

1 8. The method of Claim 1, wherein polishing comprises chemical mechanical  
2 polishing with a down force of less than or equal to approximately 3.75 psi.

1 9. The method of Claim 1, wherein polishing comprises:  
2 engaging the copper with a polishing pad with a down force less than or  
3 equal to 3.75 psi; and  
4 providing a slurry flow rate of approximately 200 ccm.

1 10. The method of Claim 9, wherein polishing further comprises an orbital  
2 speed of approximately 310 rpm and a wafer rotational speed of approximately  
3 10 rpm.

1 11. A method of polishing a film, comprising:  
2 polishing the film with a slurry having a pH in a range such that a  
3 protective layer is formed over the film during polishing.

1 12. The method of Claim 11, wherein the film comprises copper and the pH is  
2 the range of approximately 8 to 11.5.

1 13. The method of Claim 12, wherein the slurry comprises a precipitated  $\text{SiO}_2$ .

1 14. The method of Claim 13, wherein the precipitated  $\text{SiO}_2$  comprises  
2 approximately 2 to 10 wt.% of the slurry.

1 15. A slurry, comprising:  
2 an abrasive comprising precipitated  $\text{SiO}_2$ ;  
3 an oxidizer;  
4 a corrosion inhibitor; and  
5 a buffer system;  
6 wherein the slurry has a pH between 8 and 11.5.

1 16. The slurry of Claim 15, wherein the abrasive is approximately 5 wt.%  
2 precipitated  $\text{SiO}_2$ .

1 17. The slurry of Claim 15, wherein the oxidizer comprises  $(\text{NH}_4)_2\text{S}_2\text{O}_8$ .

1 18. The slurry of Claim 17, further comprising reaction products of  
2  $(\text{NH}_4)_2\text{S}_2\text{O}_8$ .

- 1 19. The slurry of Claim 15, wherein the oxidizer comprises  $K_2S_2O_8$ .
- 1 20. The slurry of Claim 19, further comprising reaction products of  $K_2S_2O_8$ .
- 1 21. The slurry of Claim 15, wherein the oxidizer comprises  $K_3Fe(CN)_6$ .
- 1 22. The slurry of Claim 21, further comprising reaction products of  $K_3Fe(CN)_6$ .
- 1 23. The slurry of Claim 15, wherein the corrosion inhibitor comprises  
2 benzotriazole.
- 1 24. The slurry of Claim 15, wherein the buffer comprises  $K_3PO_4$  and  $K_2HPO_4$ .
- 1 25. The slurry of Claim 18, further comprising a getter such as  $Ba(OH)_2$ .
- 1 26. The slurry of claim 20 further comprising a getter such as  $Ba(OH)_2$ .
- 1 27. A slurry comprising:  
2 water;  
3 approximately 5 wt. % precipitated  $SiO_2$ ;  
4 approximately 0.05 M  $(NH_4)_2S_2O_8$ ;  
5 approximately 0.005 M benzotriazole; and

- 6 a buffer comprising approximately 0.175 g/l  $K_3PO_4$  and approximately  
7 0.046 g/l  $K_2HPO_4$ ;  
8 wherein the slurry has a pH between approximately 8 and 11.5.

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